Space Weather Forecast

Issued on Friday, 20 May 2022 at 13:01 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: R1-R2 Radio Blackouts likely with Moderate-class X-ray flares. Chance of Strong flares and R3 Radio blackouts

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate in the last 24 hours with two Moderate class flares observed, the strongest of which came from the largest and most complex sunspot region located in the northern central disc. Despite its size and magnetic complexity, it is not showing evident signs of growth and appears to be mature and stable, with flare activity remaining somewhat muted. There are six other sunspot regions on the Earth-facing disc, two of which are rather large and showing signs of growth. The others are much smaller, and are either stable or showing signs of declining. There were no Earth-directed Coronal Mass Ejections (CMEs) observed.

Solar Wind / Geomagnetic Activity: The solar wind remained broadly elevated after a small enhancement was observed at 19/1320 UTC, perhaps associated with the arrival of the fast wind originating from a coronal hole, but also potentially related to a weak glancing blow originating from a CME that was observed leaving the sun days ago. This was also seen in the magnetic field carried by the wind, rising from weak to moderate levels at this time. However, the north-south component of the magnetic field remained weak and geomagnetic activity remained Quiet to Unsettled.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) remained at background with no enhancement from any of the flares that occurred. Consequently no solar radiation storms occurred.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is Likely to be Moderate, with further M-class flares, and a Chance of an isolated Strong-class flare (R3 Radio Blackout). The main source of the activity is likely to be from the large central disc sunspot, although some further flaring is also possible the sunspot near this region that produced the larger moderate flare on the 19th, and with a lower chance from the other five regions. A couple of large filaments can also be observed on or approaching the western hemisphere; these will need to be monitored for any potential lift-offs.

Solar Wind / Geomagnetic Activity: A weak CME was observed leaving the sun on the 17/0510 UTC. This has been assessed as most likely passing behind Earth's orbit on day 1 (20th) but it may have already passed (on the 19th). Solar winds are expected to remain elevated on day 1 (20th) otherwise, under the ongoing influence of a coronal hole, before slowly easing the following days. Geomagnetic activity is forecast to be Quiet with isolated Unsettled spells, but with a chance of an isolated Active period on day 1 (20th).

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Energetic Particles / Solar Radiation: The energetic particle count rate is expected to remain at background levels but this will need to be re-assessed on a daily basis as a large sunspot region, currently Earth-facing, has the potential to trigger strong flares, giving an increased chance of solar radiation storms.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	5	1	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	70	70	70	70
Very Active	R3 to R5 X	No	25	20	15	15

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	10	10	10
Very Active	≥ S3 *	No	1	1	1	1

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Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	10	10	10	10
Very Active	**≥ S3 ***	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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